REMARKS

This amendment is in response to the first office action mailed February 23, 2005. In the first Office Action, the Examiner rejected claims 1-15 under 35 U.S.C. § 112 second paragraph as being indefinite and failing to distinctly claim the subject matter of the invention. Claims 1-2 were rejected under § 103(a) as being obvious over Comino et al. in view of Simmons. Claims 8 and 13 were rejected under § 103(a) as being unpatentable over Comino et al. in view of Simmons and Park. Applicant notes with appreciation the indication of allowable subject matter in claims 3-7, 9-12 and 14-15 if these claims were amended to correct the rejections under § 112(2) and where applicable include limitations of the base claim and intervening claims.

The present invention is directed to an RC tracking loop that includes a parasitic insensitive integrator (211) that is charged by a buffer (207) with offset compensation. The integrator (211) operates to provide an accurate ramped voltage proportional to a measured RC time constant. A single comparator (213) is used for measuring the slope of the voltage ramp rate by detecting two multiplexed reference voltages. A timer within the controller (201) is triggered by a reference voltage crossing the comparator. The timer counts the number of precision reference clock periods that occur between the crossing and adjusting an accumulator with the controller (201) to a value (M). This M value is directly used to adjust a resistor and/or capacitor array used in a continuous time filter whose bandwidth and corner frequency can be precisely tuned.

With regard to the Examiner's rejection under § 112(2), Applicant will answer each of the Examiner's questions individually. In claim 1, the Examiner has indicated that the meanings of the "measured time constant" in line 3 and "predetermined events" in line 7 are not clear. Moreover, the Examiner has questioned where the time constant comes from and how it can be measured. In response, the measured RC time constant refers to that of the tracking loop. Moreover, claim 1 further recites "a timer activated by the comparator for counting a time period between predetermined events". In response to the Examiner's inquiry, the phrase "predetermined events" refers to the integrator voltage ramp output crossing two predetermined voltage reference values. As noted in the specification, since the signal being measured is a

voltage ramp, two separate voltage references will cause two separate events at different points in time, allowing the same comparator to make both decisions.

In claim 2, the Examiner has indicated that it is unclear how the integrator can be "placed into a unity gain mode" and also indicated that the language "input offset voltage" in line 4 lacks clear antecedent basis. The Examiner should recognize that the integrator is an active integrator consisting of an operational amplifier or an operational trans-conductance amplifier (OTA). Such operation is only evident in an active integrator and not a passive integrator. The active integrator is used to provide a parasitically immune RC time-constant measurement of the RC tracking loop. The offset compensation (209) allows correction of the active integrators input offset voltage which is present in all op-amp and OTA circuits.

In claim 3, the Examiner has indicated that the meanings of the "accumulator" in line 1, the "one component network" in line 2 and the "continuous filter" in line 3 are not clear. He further questioned where they come from and how they are read on the preferred embodiment. Insofar as understood, no such components are seen on the drawings and are incomplete. In response, the accumulator is contained within the digital block 201 and provides an M-bit word which is used to adjust the at least one component network in a continuous-time filter. Perhaps the term "one component network" should read "one RC component network" since the tracking-loop is referred to in several places as an RC tracking loop. The phrase "adjust" can be accomplished by digitally combining resistors and/or capacitors to affect the resultant RC product of both the tracking loop and the continuous-time filter. The Examiner will recognize that the relative value of the RC product of the tracking loop tracks that of the continuous-time filter, therefore, if the tracking loop RC product is "tuned," so is the continuous-time filter. This is explained in detail in lines 5 to 26 on page 6 of Applicant's specification.

In claim 5, the Examiner has indicated that the recitation "RC time constant" in line 2 is confusing because it is unclear whether this is an additional "time constant" or a further recitation of the previously claimed "time constant" in line 3 of claim 1. The RC time constant "within the continuous time filter" referred to in claim 5 is a different RC time constant then that in claim 1, and is described in the specification that both RC time constants are closely related.

By minimizing the error of the RC time constant referred to in claim 1, this also minimizes the error of the RC time constant in the continuous time filter.

In claim 8, the Examiner has indicated that the recitation "the RC time constant" in line 5 and "the single comparator" in line 9 lack clear and antecedent basis. Additionally, the Examiner has questioned how the reference signal in line 8 can be "multiplexed" since no means for performing the multiplexing function is recited. In response thereto, claim 8 has not been amended to correct the issues with antecedent basis. In response to the Examiner's inquiry, no detailed circuit is provided to teach multiplexing since it should be evident to those skilled in the art that analog multiplexing may be accomplished using two or more solid-state switches. This allows two or more voltages or currents to be applied to the comparator at any given time.

In claim 10, the Examiner has indicated that the term "continuous time filter parameters" is unclear. In response thereto, Applicant has now amended claim 10 to recite continuous time filter RC time constants to better define the invention and make it consistent with other claim language.

In claim 11, the Examiner has indicated that the meanings of "comparator delay and offset" are unclear. Additionally, he has asked for the origination of the offset and how it is canceled by the comparator. In response, the comparator as used in the invention is an active comparator having an active amplifier stage. An active comparator is susceptible to input offsets which translate to error in detection of the integrators ramp voltage resulting in an RC time constant measurement error. This error will cause the timer 201 to start and stop either early or late by the same amount of time. Since the same input offset and delay is present for each comparator crossing detection, the delay effects cancel out of the measurement of the ramps slope.

In claim 12, the Examiner has indicated that the recitation "the compensation circuit" lacks clear antecedent basis. In response thereto, claim 12 has now been amended to correct the problem with antecedent basis.

In claim 14, the Examiner has indicated that the recitation "the RC time constant" in line 4 lacks clear antecedent basis. Moreover, the Examiner has noted that the "buffer and integrator" and "a predetermined range" in line 14 is confusing because it is unclear if this is an

additional "buffer and integrator" and "predetermined range" or further a recitation of the previously claimed "buffer and integrator" in line 3 and "predetermined range" in line 13. In response and as noted previously, the RC time constant referred to in claim 14 is the RC time constant used in the tracking loop which is proportional to the RC time constant used in the continuous-time filter. Further, claim 14 has now been amended to indicate that the ramped output voltage from the integrator is proportional to the RC time constant used in the RC tracking loop. With regard to the "buffer and integrator" and "predetermined range," these limitations refer to the aforementioned references in claim 14, lines 3 and 13.

In claim 15, the Examiner has indicated that the recitation "the value" lacks clear antecedent basis. In response, this has now been corrected by amendment. Once the value of the accumulator after the RC tracking loop has had sufficient time to reach an optimal value for the M-bit word, this value is also applied to the continuous-time filter. Accordingly, the RC time constant of the continuous-time filter and the RC tracking loop will track one another allowing the continuous-time filter to be optimally tuned as well.

With regard to the rejections under § 103(a) the Examiner has essentially relied on the Comino, Simmons and Park patents to show it would have been obvious to provide the invention as claimed. Comino et al. teach a tuning circuit generating a digital code to be used to calibrate a capacitor array in an active RC filter. Simmons teaches a circuit for filtering electrical waveforms in which the use information is contained in patterns and spacing of zero voltage crossings. Park teaches an n-bit analog-to-digital converter and presumably has been cited to teach a selectable reference circuit.

In response to the Examiner's indication of allowable subject matter, claims 1 and 8 have been amended to further recite an accumulator that is controlled by the timer that is incremented or decremented based upon whether the timer count falls within a predetermined range. Since the Examiner has indicated that the prior art of record does not teach this element and in view of the amendments to correct the issues under § 112(2), Applicant requests the rejections made in the first office action be withdrawn. The use of an accumulator in connection with an RC tracking loop is neither taught nor suggested by the prior art of record. Accordingly, Applicant respectfully suggests that this application is now in condition for allowance and an early notice

thereof is requested. Should the Examiner have any comments or suggestions that would expedite the allowance of this application, he is respectfully requested to telephone the undersigned.

No amendment made was related to the statutory requirements of patentability unless expressly stated herein. Moreover, no amendment made was for the purpose of narrowing the scope of any claim unless Applicant has argued herein that such amendment was made to distinguish over a particular reference or combination of references.

Please charge any additional fees associated with this amendment and credit any overpayments to Deposit Account No. 50-0223. A duplicate original of this sheet is enclosed.

Respectfully submitted,

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